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(54) **GENERATING CANDIDATE INCLUSION/EXCLUSION COHORTS FOR A MULTIPLY CONSTRAINED GROUP**

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G06F 17/30 (2006.01)

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USPC 705/7.22, 7.23; 709/223
See application file for complete search history.

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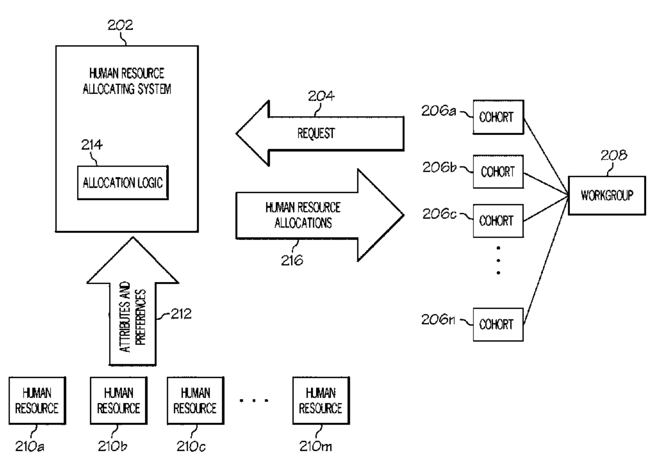
(57) **ABSTRACT**

A computer implemented method, program product, and/or system allocate human resources to a cohort. At least one attribute held by each member of a group of human resources is identified. A request is received, from a planned cohort, for multiple human resources that collectively possess a set of predefined attributes, wherein no single human resource possesses all of the predefined attributes. The set of human resources that satisfies the request is identified and assigned to the planned cohort.

17 Claims, 4 Drawing Sheets



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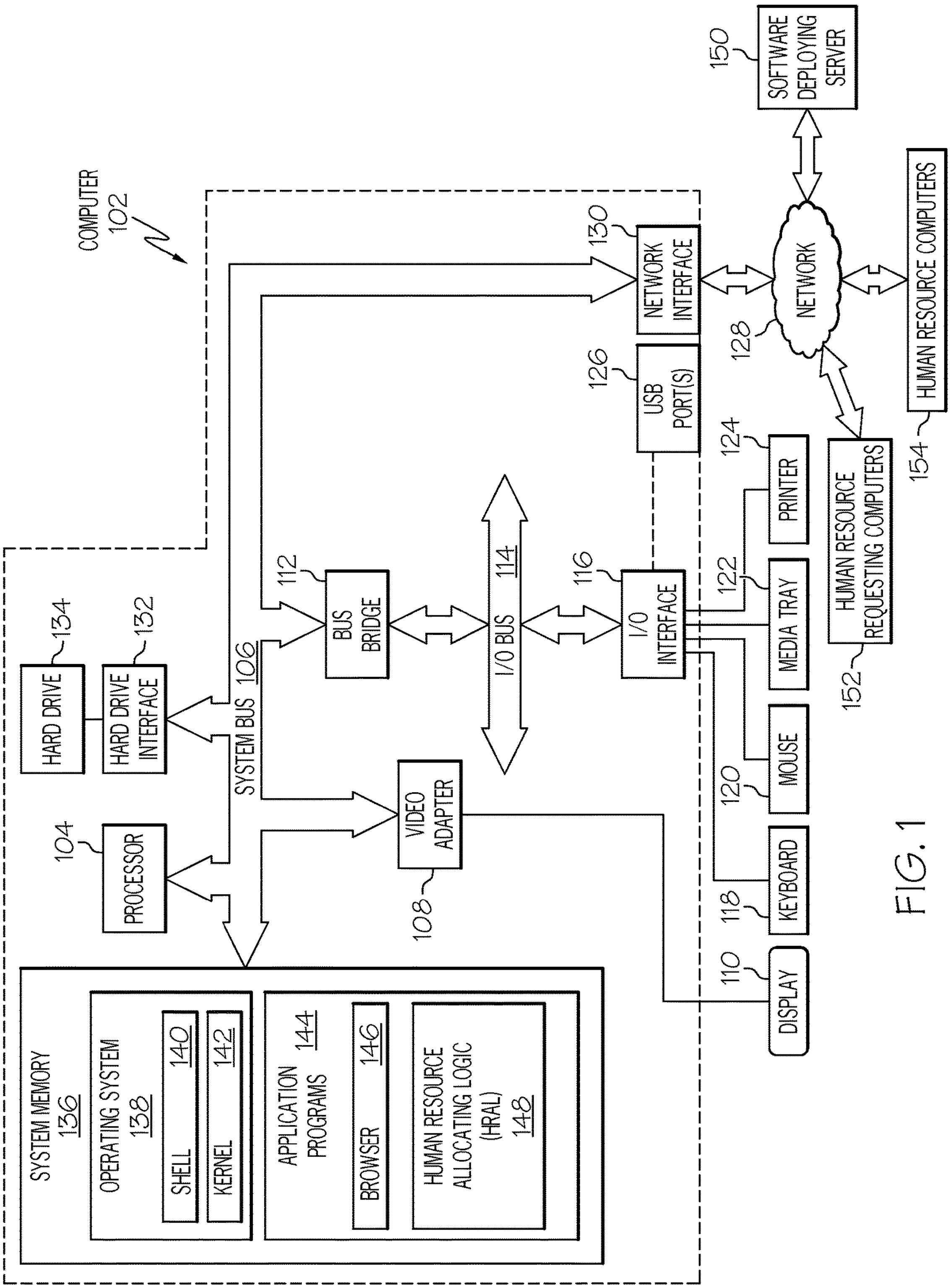
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DISPLAY
110
KEYBOARD
118
MOUSE
120
MEDIA TRAY
122
PRINTER
124
USB PORT(S)
126
NETWORK INTERFACE
130
NETWORK
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SOFTWARE DEPLOYING SERVER
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HUMAN RESOURCE COMPUTERS
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KERNEL 142
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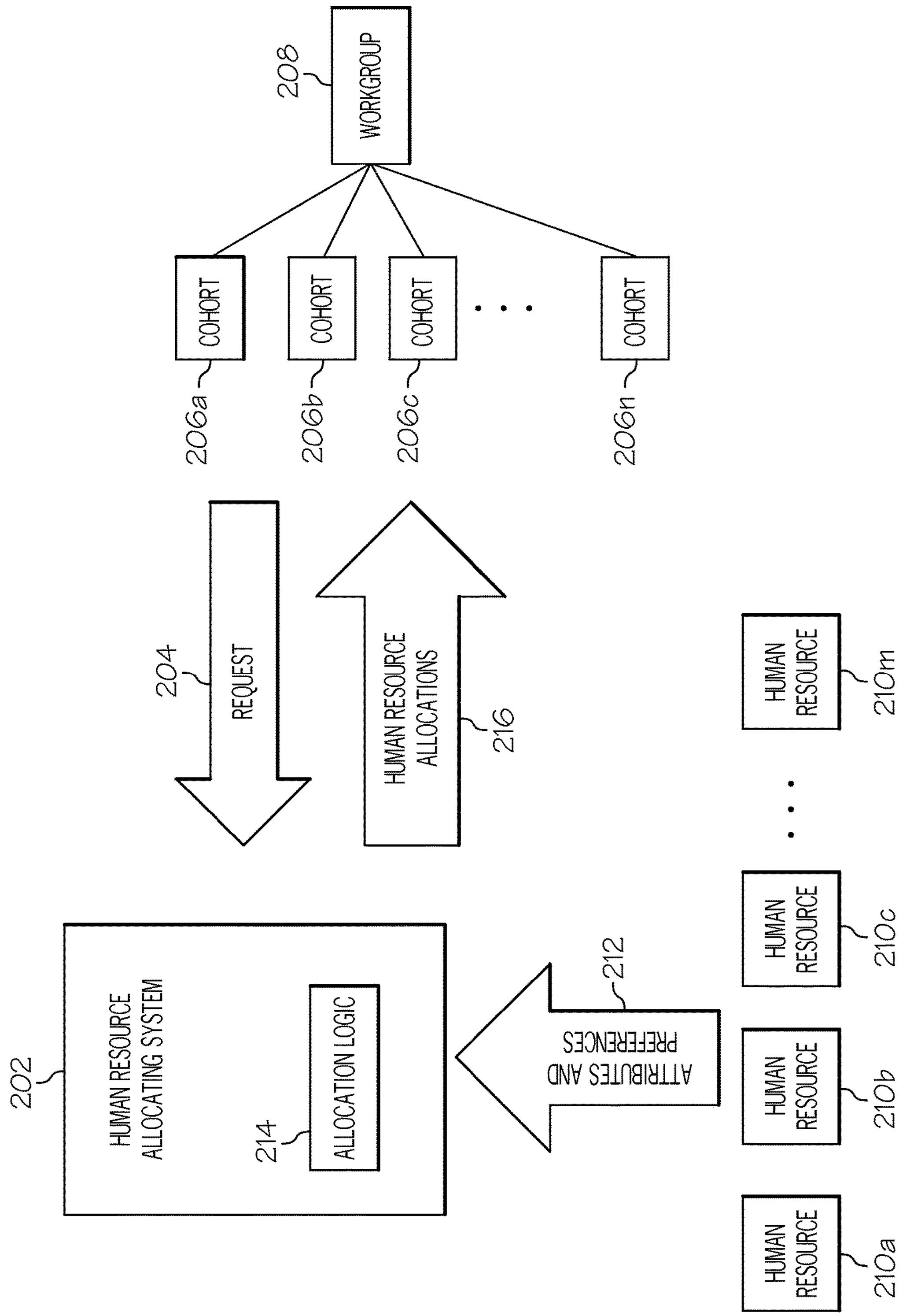
HUMAN RESOURCE ALLOCATING LOGIC (HRAL) 148

FIG. 1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COHORT
206c
COHORT
206n
REQUEST
204
HUMAN RESOURCE ALLOCATIONS
216
HUMAN RESOURCE ALLOCATING SYSTEM
202
ALLOCATION LOGIC
214
ATTRIBUTES AND PREFERENCES
212
HUMAN RESOURCE
210a
HUMAN RESOURCE
210b
HUMAN RESOURCE
210c
HUMAN RESOURCE
210m

FIG. 2

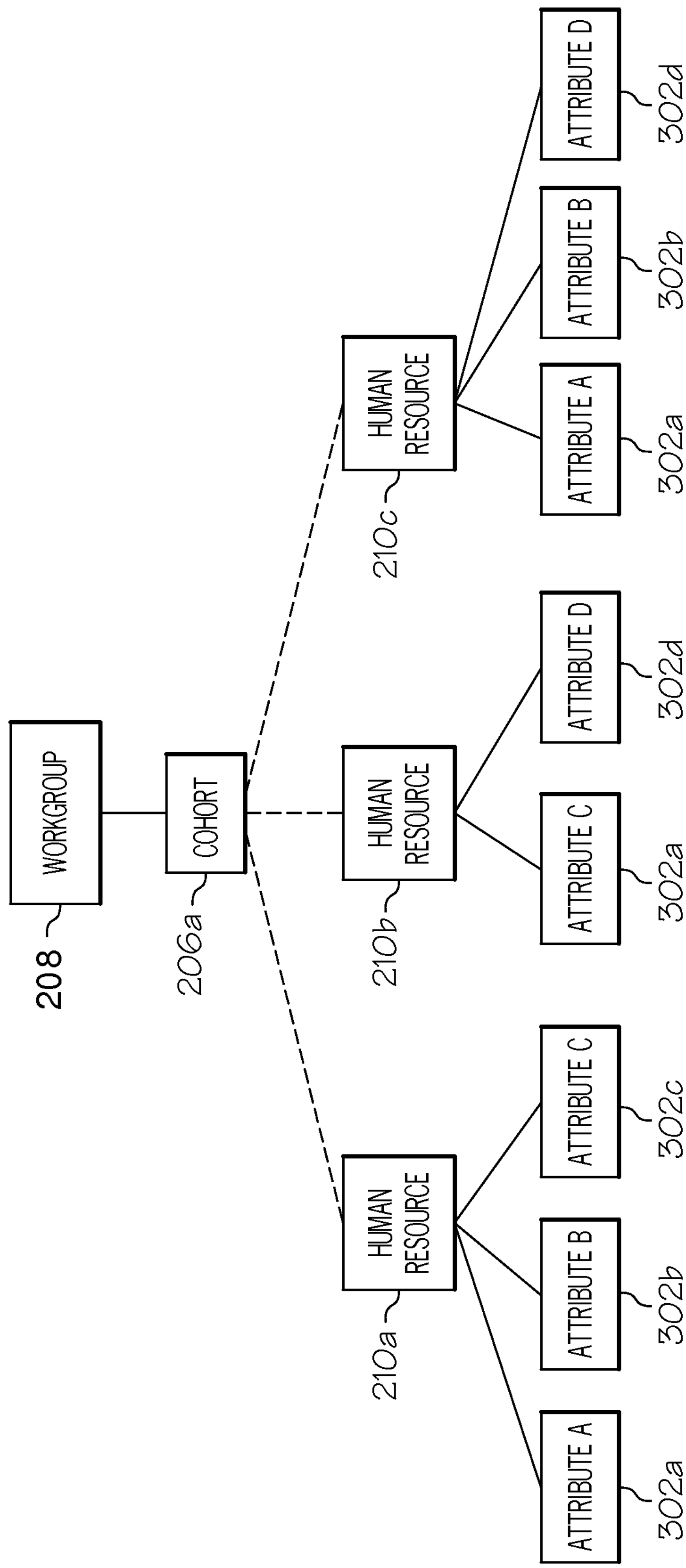
WORKGROUP
208
COHORT
206a
HUMAN RESOURCE
210a
HUMAN RESOURCE
210b
HUMAN RESOURCE
210c
ATTRIBUTE A
302a
ATTRIBUTE B
302b
ATTRIBUTE C
302c
ATTRIBUTE C
302a
ATTRIBUTE D
302d
ATTRIBUTE A
302a
ATTRIBUTE B
302b
ATTRIBUTE D
302d

FIG. 3

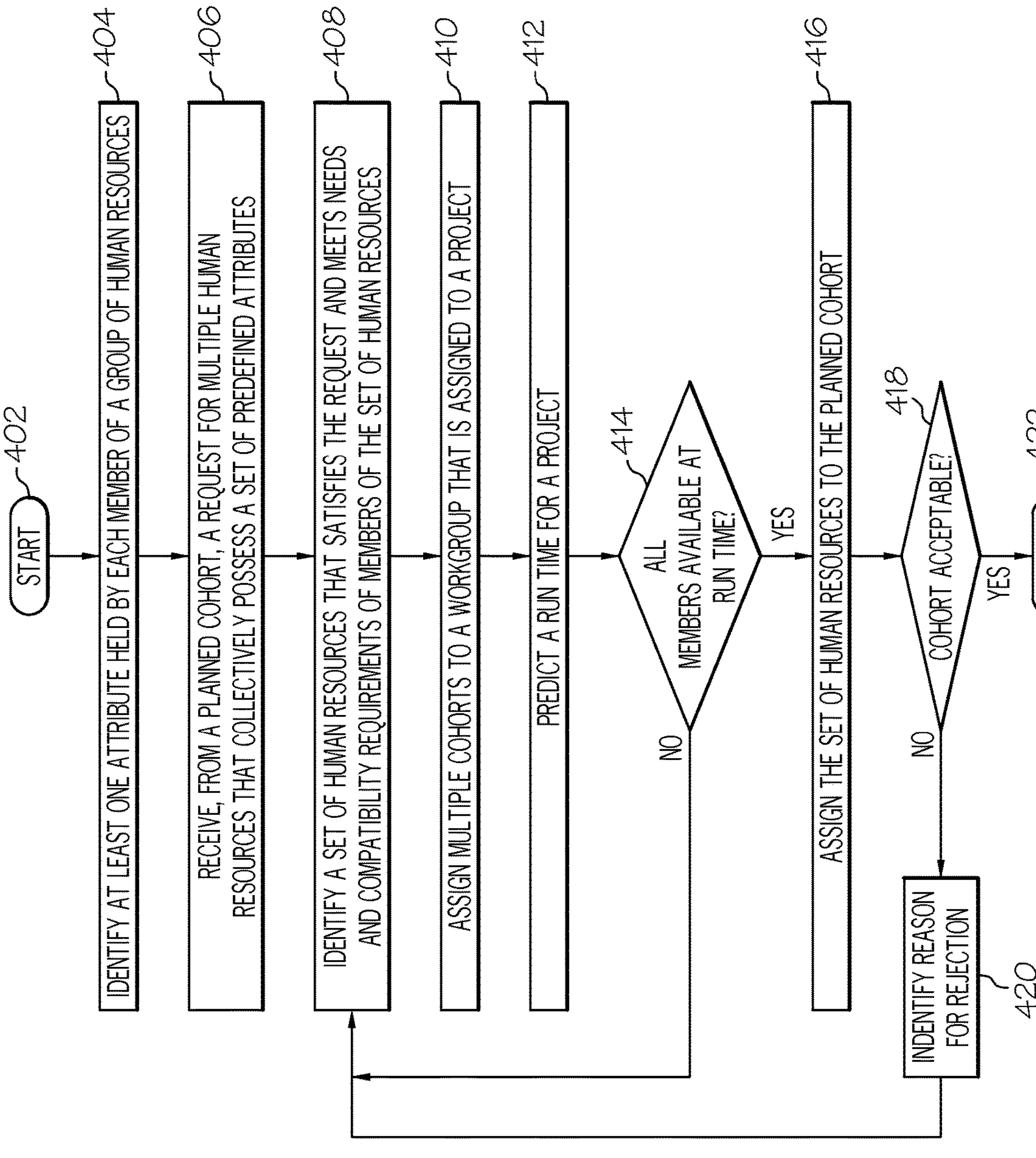
START
402
IDENTIFY AT LEAST ONE ATTRIBUTE HELD BY EACH MEMBER OF A GROUP OF HUMAN RESOURCES
404
RECEIVE, FROM A PLANNED COHORT, A REQUEST FOR MULTIPLE HUMAN RESOURCES THAT COLLECTIVELY POSSESS A SET OF PREDEFINED ATTRIBUTES
406
IDENTIFY A SET OF HUMAN RESOURCES THAT SATISFIES THE REQUEST AND MEETS NEEDS AND COMPATIBILITY REQUIREMENTS OF MEMBERS OF THE SET OF HUMAN RESOURCES
408
ASSIGN MULTIPLE COHORTS TO A WORKGROUP THAT IS ASSIGNED TO A PROJECT
410
PREDICT A RUN TIME FOR A PROJECT
412
ALL MEMBERS AVAILABLE AT RUN TIME?
414
NO
YES
ASSIGN THE SET OF HUMAN RESOURCES TO THE PLANNED COHORT
416
COHORT ACCEPTABLE?
418
NO
YES
INDENTIFY REASON FOR REJECTION
420
END
422

FIG. 4

GENERATING CANDIDATE INCLUSION/EXCLUSION COHORTS FOR A MULTIPLY CONSTRAINED GROUP

BACKGROUND

The present disclosure relates to the field of computers, and specifically to the use of computers in allocating human resources. Still more particularly, the present disclosure relates to the use of computers to allocate human resources to cohorts used by a workgroup.

BRIEF SUMMARY

A computer implemented method, program product, and/or system allocate human resources to a cohort. At least one attribute held by each member of a group of human resources is identified. A request is received, from a planned cohort, for multiple human resources that collectively possess a set of predefined attributes, wherein no single human resource possesses all of the predefined attributes. The set of human resources that satisfies the request is identified and assigned to the planned cohort.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** depicts an exemplary computer in which the present disclosure may be implemented;

FIG. **2** illustrates relationships among a resource allocating system, multiple cohorts, and multiple human resources;

FIG. **3** depicts exemplary attributes that are attributed to each human resource; and

FIG. **4** is a high level flow chart of one or more exemplary actions taken by a processor to allocate human resources to different cohorts.

DETAILED DESCRIPTION

As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method or computer program product. Accordingly, aspects of the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a "circuit," "module" or "system." Furthermore, aspects of the present invention may take the form of a computer program product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

Any combination of one or more computer readable medium(s) may be utilized. The computer readable medium may be a computer readable signal medium or a computer readable storage medium. A computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium would include the following: an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any

suitable combination of the foregoing. In the context of this document, a computer readable storage medium may be any tangible medium that can contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device.

A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electro-magnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that can communicate, propagate, or transport a program for use by or in connection with an instruction execution system, apparatus, or device.

Program code embodied on a computer readable medium may be transmitted using any appropriate medium, including, but not limited to, wireless, wireline, optical fiber cable, RF, etc., or any suitable combination of the foregoing.

Computer program code for carrying out operations for aspects of the present invention may be written in any combination of one or more programming languages, including an object oriented programming language such as Java, Smalltalk, C++ or the like and conventional procedural programming languages, such as the "C" programming language or similar programming languages. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider).

Aspects of the present invention are described below with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems) and computer program products according to embodiments of the invention. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

These computer program instructions may also be stored in a computer readable medium that can direct a computer, other programmable data processing apparatus, or other devices to function in a particular manner, such that the instructions stored in the computer readable medium produce an article of manufacture including instructions which implement the function/act specified in the flowchart and/or block diagram block or blocks.

The computer program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatus or other devices to produce a computer implemented process such that the instructions which execute on the computer or other programmable apparatus provide processes for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

With reference now to the figures, and in particular to FIG. **1**, there is depicted a block diagram of an exemplary computer **102**, which may be utilized by the present invention. Note that some or all of the exemplary architecture, including both depicted hardware and software, shown for and within computer **102** may be utilized by software deploying server **150**, human resource requesting computers **152** and/or human resource computers **154**.

Computer **102** includes a processor **104** that is coupled to a system bus **106**. Processor **104** may utilize one or more processors, each of which has one or more processor cores. A video adapter **108**, which drives/supports a display **110**, is also coupled to system bus **106**. System bus **106** is coupled via a bus bridge **112** to an input/output (I/O) bus **114**. An I/O interface **116** is coupled to I/O bus **114**. I/O interface **116** affords communication with various I/O devices, including a keyboard **118**, a mouse **120**, a media tray **122** (which may include storage devices such as CD-ROM drives, multi-media interfaces, etc.), a printer **124**, and external USB port(s) **126**. While the format of the ports connected to I/O interface **116** may be any known to those skilled in the art of computer architecture, in one embodiment some or all of these ports are universal serial bus (USB) ports.

As depicted, computer **102** is able to communicate with a software deploying server **150**, human resource requesting computers **152**, and/or human resource computers **154** using a network interface **130**. Network **128** may be an external network such as the Internet, or an internal network such as an Ethernet or a virtual private network (VPN).

A hard drive interface **132** is also coupled to system bus **106**. Hard drive interface **132** interfaces with a hard drive **134**. In one embodiment, hard drive **134** populates a system memory **136**, which is also coupled to system bus **106**. System memory is defined as a lowest level of volatile memory in computer **102**. This volatile memory includes additional higher levels of volatile memory (not shown), including, but not limited to, cache memory, registers and buffers. Data that populates system memory **136** includes computer **102**'s operating system (OS) **138** and application programs **144**.

OS **138** includes a shell **140**, for providing transparent user access to resources such as application programs **144**. Generally, shell **140** is a program that provides an interpreter and an interface between the user and the operating system. More specifically, shell **140** executes commands that are entered into a command line user interface or from a file. Thus, shell **140**, also called a command processor, is generally the highest level of the operating system software hierarchy and serves as a command interpreter. The shell provides a system prompt, interprets commands entered by keyboard, mouse, or other user input media, and sends the interpreted command(s) to the appropriate lower levels of the operating system (e.g., a kernel **142**) for processing. Note that while shell **140** is a text-based, line-oriented user interface, the present invention will equally well support other user interface modes, such as graphical, voice, gestural, etc.

As depicted, OS **138** also includes kernel **142**, which includes lower levels of functionality for OS **138**, including providing essential services required by other parts of OS **138** and application programs **144**, including memory management, process and task management, disk management, and mouse and keyboard management.

Application programs **144** include a renderer, shown in exemplary manner as a browser **146**. Browser **146** includes program modules and instructions enabling a world wide web (WWW) client (i.e., computer **102**) to send and receive network messages to the Internet using hypertext transfer protocol (HTTP) messaging, thus enabling communication with software deploying server **150** and other described computer systems.

Application programs **144** in computer **102**'s system memory (as well as software deploying server **150**'s system memory) also include a human resource allocating logic (HRAL) **148**. HRAL **148** includes code for implementing the processes described below, including those described in FIGS. **2**-**4**. In one embodiment, computer **102** is able to download HRAL **148** from software deploying server **150**, including in an on-demand basis, wherein the code in HRAL **148** is not downloaded until needed for execution to define and/or implement the improved enterprise architecture described herein. Note further that, in one embodiment of the present invention, software deploying server **150** performs all of the functions associated with the present invention (including execution of HRAL **148**), thus freeing computer **102** from having to use its own internal computing resources to execute HRAL **148**.

The hardware elements depicted in computer **102** are not intended to be exhaustive, but rather are representative to highlight essential components required by the present invention. For instance, computer **102** may include alternate memory storage devices such as magnetic cassettes, digital versatile disks (DVDs), Bernoulli cartridges, and the like. These and other variations are intended to be within the spirit and scope of the present invention.

Referring now to FIG. **2**, a relationship among a human resource allocating system **202** (e.g., computer **102** shown in FIG. **1**), multiple cohorts **206***a*-*n* (where "n" is an integer), and multiple human resources **210***a*-*m* (where "m" is an integer) is presented. A "cohort" is defined as a group of individuals that, when combined, provide some predefined functionality. For example, a cohort may be a group of professionals that, collectively, are able to analyze a set of medical research data. In another example, a cohort may be a group of workers that are able to receive orders for a product, while another cohort is a group of dispatchers and drivers that can deliver this product. Note that a workgroup **208** can be made up of multiple cohorts, where each cohort performs one or more predefined functions.

Assume that workgroup **208** is assigned to a particular project. Workgroup **208** can plan on having multiple cohorts to perform sub-processes of that project. As such, these planned cohorts send the human resource allocating system **202** a request **204**. Request **204** is from one of the cohorts **206***a*-*n* (e.g., using one of the human resource requesting computers **152** shown in FIG. **1**), and requests multiple human resources that collectively possess a set of predefined attributes. These attributes, as well as preferences (discussed below) of human resources **210***a*-*m*, are sent as attributes and preferences **212** from one or more of the human resources **210***a*-*m* (e.g., using one of the human resource computer **154**) to the human resource allocating system **202**, which executes allocation logic **214** (e.g., one or more components of HRAL **148** shown in FIG. **1**). Based on the attributes and preferences **212**, the allocation logic **214** then allocates/assigns a set of human resource allocations **216** to each requesting planned cohort (i.e., one or more of elements **206***a*-*n*).

With reference now to FIG. **3**, note that each human resource (from elements **210***a*-*m* shown in FIG. **2**) possess one or more attributes. For example, human resource **210***a* holds attributes **302***a*, **302***b*, and **302***c*; human resource **210***b* holds attributes **302***a* and **302***d*; and human resource **210***c* holds attributes **302***a*, **302***b*, and **302***d*. Examples of such attributes include, but are not limited to, a specific type of license or certification (e.g., a medical license, a law license (e.g., from a state, federal, or patent bar), a commercial driver's license, certification in a technical area, etc.) held by the human resource; a predefined level of education (e.g., a postgraduate-level engineering degree, a medical degree, a law degree, etc.) of a human resource; a medical condition (e.g., being afflicted with a type of disease being studied in a research project, a lack of a medical illness that may conflict with a medical research project, being a non-smoker, etc.) of a human resource; a life experience (e.g., based on a person's travel experiences, work history, etc.) of a human resource; etc. Note that the attributes may be negative requirements, such as no driving while intoxicated charges if looking for a driver, a lack of certain medical conditions that might interfere with a medical research project, etc.

Assume now that a project to which workgroup **208** has been assigned requires a cohort (e.g., cohort **206***a*) to include human resources that collectively have attributes A-D (where no individual human resource has all of these attributes). This scenario provides three possible solutions: human resource **210***a* (who has attributes A, B, C) combined with human resource **210***b* (who has duplicate attribute C along with needed attribute D); human resource **210***a* (who has attributes A, B, C) combined with human resource **210***c* (who has duplicate attributes A and B along with needed attribute D); human resource **210***b* (who has attributes C and D) combined with human resource **210***c* (who has duplicate attribute D along with needed attributes A and B). A processor can decide which of these combinations to use by applying other constraints to the problem.

For example, assume that human resource **210***a* has been assigned a weight that is higher than the weight held by human resource **210***b*. This weight describes how valuable each human resource is to the planned cohort **206***a* and/or workgroup **208** and/or the project. The weight can be based on a set of predefined attributes needed by the cohort/workgroup/project. Thus, since human resource **210***a* and human resource **210***c* have more needed attributes than human resource **210***b*, then one of human resource **210***a* or human resource **210***c* will be assigned to the planned cohort **206***a*. Since human resource **210***a* or human resource **210***c* have the same number of attributes, the "tie" can be broken based on several factors. In one embodiment, the different attributes are given different weights (based on how significant they are to the project). Thus, if attribute **302***d* has a higher significance weight than attribute **302***a* or attribute **302***b*, then human resource **210***c* would be selected to be combined with human resource **210***b* to make up cohort **206***a*.

In one embodiment, features, related to a particular individual, beyond those defined by attributes **302***a-d* may determine which human resources are used to create cohort **206***a*, based on some enterprise rule (such as criteria for tenure selection). For example, assume that human resource **210***a* is a professor in a university who is due for tenure consideration, while human resources **210***a-b* are too junior for such consideration. If selection to work with workgroup **208** via cohort **206***a* would be beneficial to human resource **210***a*, then that person would be given preference (e.g., would be assigned a higher weight) to join cohort **206***a*. Thus, a balance is struck between the needs of the cohort/workgroup/project and the needs of the individual person under consideration for inclusion in the cohort **206***a*.

With reference now to FIG. **4**, a high level flow chart of one or more exemplary actions performed by a processor to allocate human resources to different cohorts is presented. After initiator block **402**, which may be prompted by managers of a project determining that there is a need for a multi-cohort workgroup, at least one attribute held by each member of a group of human resources is identified (block **404**). In one embodiment of the present disclosure, this group of human resources is initially a set of human resources that are assumed, if not known, to be available to work on the project. As described herein, these attributes can be educational credentials, licenses, work histories, life experiences, skills, tools/equipment (i.e., specialized research equipment, a car, etc.) that is owned or under the control of a particular person, reputations/awards/honors, etc. In one embodiment, allocating/assigning/identifying attributes to specific individuals (members of the group of human resources) is performed by crawling available databases, both private and public. For example, logic can crawl every paper (including private publications and/or public publications) written by an individual. The crawling logic will search for certain key words/phrases that indicate that this individual has an interest and/or expertise in the project for which human resources are being recruited. Other databases include audio recordings (by using a voice-to-text translation or speech recognition logic); biographical descriptions from papers, websites, seminars, etc.; resumes/curricula vitae of the individual; mention of the individual by name in a study, news article, etc.

In one embodiment, if the databases being crawled are writings/speeches by the individual, then keyword searches can be for words from a particular field's specialized lexicon. For example, assume that an individual has used the term "nyctalopia", which means "night blindness." Since "nyctalopia" is not a commonly used word, an assumption can be made by computer logic that the person who used the term has an interest and/or an expertise in ophthalmology/optometry. In this example, therefore, the attribute "Interest and/or Expertise in Vision" would be assigned to that individual by the computer logic/processor.

In one embodiment, an individual's interest/expertise can be determined by the frequency, consistency, and/or longevity of terminology usage in available databases. For example, assume that crawling available databases reveals three individuals who use a certain predetermined term. A first person has been consistently (year after year) using the term in nearly all of his writings/speeches during the past twenty years. A second person used the term frequently twenty years ago, but has not used it since then. A third person used the term frequently during the current year, but had never used the term before. In this example, computer logic can conclude that the person with the highest level of interest/expertise in the subject associated with the crawled term is the first person, due to the long and consistent use of the term. The third person would have the next highest level of interest/expertise, since that person has demonstrated a current interest in the field through her writings/speeches. The second person would have an interest level of interest/expertise below that of the third person, since the second person apparently is no longer interested in the field. Of course, all three persons presumptively show a higher level of interest/expertise than anyone who has never used the term at all. Note that additional computer logic is used to recognize archaic terms. That is, if the crawling logic is looking for "Term A" (e.g., "Pertussis"), which used to be called "Term B" (e.g., "Whooping Cough"), then the crawling logic will use a mapping logic between these two terms in order to search for both terms.

Note that crawling of publications can also include an attribute weight value based on the document from which selected terms are identified. For example, assume that "Term A", which has been deemed to be indicative of an interest in "Topic X", has been used by a first individual in "Prestigious Journal", while the same term has been used by a second individual in "Disreputable Journal". In this example, a higher weighting is given to the attribute of "Interest/Expertise in Topic X" for the first individual over the second individual. Therefore, the first individual will be chosen over the second individual to meet the attribute requirement of "Interest/Expertise in Topic X" for a certain project.

Note further that the source of the databases being crawled may be kept secret. That is, while crawling logic may have access to a database that is sensitive, if not actually security protected, the identity of that database should be shielded from non-crawling logic. For example, assume that the crawling logic located a term, used by an individual, which indicates that individual's interest in a particular field/topic/subject area, and that the term usage by that individual was from an enterprise's internal accounting system. Details of what is in this database may be required, by rules/regulations/statute/policy, to be kept confidential. Thus, while the crawling logic can use the database to assign an attribute (i.e., "Interest/Expertise in Corporate Financial Write-offs") to an individual, the crawling logic should not identify the database itself, since doing so may reveal insider information about the enterprise's finances.

The various embodiments described in the database crawling discussed herein describe a predetermined significance rule. Examples of such predetermined significance rules described herein include frequency, longevity, and consistency of usage; usage in weighted publications; usage of arcane terms; etc.

A request is received for multiple human resources that collectively possess a set of predefined attributes (block **406**). The request may be received from a planned cohort (e.g., element **206***a* shown in FIGS. **2**-**3**), which is in the planning stage for future use. As depicted herein, no individual person holds all of the needed (predefined) attributes. Therefore, a decision is made as to which individuals are selected for inclusion in a set of individuals that collectively meet the needs of the project/workgroup/cohort. As described herein, this set of individuals (human resources) is identified based on the set's ability to meet the needs of the workgroup/cohort/project, as well as to meet the needs of the individuals (block **408**). In one embodiment, the needs of the individuals include their compatibility requirements. For example, certain individuals may not be able to work together because they have ethical conflicts of interest, they live in vastly different time zones (e.g., on opposite sides of the world), they have different work calendars that are difficult, if not impossible to reconcile, etc. For example, one individual may work from a school year calendar, while another may work from a multi-year project calendar, while another may work from a unique fiscal year calendar, and another may work from a traditional (January-December) calendar. These calendars provide different work, vacation, budget, etc. considerations, which may not be compatible.

In one embodiment, certain individuals may be highly compatible if their different attributes (e.g., skill sets) complement one another, if they speak the same language (or are able to provide language interpretation skills to the cohort), if they have a shared interest in the project, etc. For example, assume that a cohort is made up of ten individuals, where four speak only Spanish and four speak only English. The remaining two individuals may be given a higher weighting (indicating their value to the cohort) if they are able to translate between the Spanish speakers and the English speakers, even though this skill set if not one of the set of predetermined attributes called for by the workgroup/project.

In one embodiment, the individual needs (including interests in certain project areas, need to be part of a project in order to further the individual's career, desire to work with certain named individuals, etc.) are received by a human resource allocating system by user-inputs from different human resources.

Continuing with block **408**, there may be occasions in which the requisite human resources are not available within an initial community. In this situation, the needed human resources can be created (by new hires, new training, contracting out, etc.), subject to financial limitations. Alternatively, the human resource allocation logic can redefine the set of predefined attributes needed by the project/workgroup/cohort. For example, assume that the project states that three medical doctors are needed for a research project. If only two medical doctors are available within a pool of human resources, then the human resource allocation logic may 1) suggest to a project manager or 2) decide on its own (based on predefined constraints) that the third member of the cohort may be a doctor of osteopathic medicine, a nurse practitioner, etc.

With further reference to block **408**, the needs of the individual also include a consideration of the type of project/cohort to which they will be assigned. For example, certain projects (e.g., establishing a set of standards for a new technology) could be considered by most cohort candidates as being more onerous than a project to evaluate proposed convention locations at various resorts around the world. Thus, if a person has dutifully served on one or more onerous projects, then that person would be given priority to participate in a project that is deemed more desirable, either by general consensus (e.g., resort shopping) or by the individual's own stated preferences.

As depicted in block **410**, multiple cohorts are defined and assigned to the workgroup. In one embodiment, each cohort satisfies at least one unique need of a project to which the workgroup is assigned. For example, assume that the project is a medical research project. A first cohort may be made up of individual having certain medical conditions being studied, while a second cohort may be made up of health care providers who will be giving physical examinations to the persons in the first cohort, and a third cohort may be made up of information technology (IT) experts who will be collecting and analyzing data resulting from the physical examinations. Thus, the functions of the multiple cohorts are defined and assigned to the workgroup for use on the project. In another embodiment, a single cohort may satisfy several needs of the project (e.g., a single cohort includes both medical professionals as well as IT experts).

As depicted in block **412**, a run time (e.g., start date through completion date) for a project can be predicted. A determination is then made (query block **414**) as to whether all members of the proposed cohorts will be available when the project actually starts/ends in the future. If all members of a particular cohort will not be available, then a new cohort will be created (block **408**), either predictively or at the actual run time. Whether the new cohort is created predictively or at run time, predicting which human resources will be available can be based on historical data (e.g., how many persons having certain attributes have become available at a same time of each of the past five years). For example, assume that a determination has been made that a cohort will need four electron microscope operators at run time, which will be two years in the future. For each of the past five years, a school's graduate program has received, at the beginning of each new school year, at least ten new students who are electron microscope operators. Thus, a reasonable/safe prediction is that there will be at least four electron microscope operators who will be available to the cohort at run time in the next year or two.

Once a determination is made that all members of the set of human resources are (or will be) available at run time, then this set of human resources are assigned to the planned cohort for use by the workgroup with the project (block **416**).

A query is then made to determine if the cohort is acceptable (query block **418**). This acceptance may come from a manager of a project, who may not explain why a cohort was accepted/rejected. That is, a manager of a project may simply reply with "Reject" when presented a cohort that has been assembled by the computer logic without giving an explanation for the rejection. In one embodiment, the reason for the rejection is determined by computer heuristics. For example, assume that all of the set of predefined attributes required for the project, as well as the needs of the individuals, have been met. However, there are still some unknown attributes that may or may not be useful to the project and/or in meeting the needs of the individuals. For example, a certain individual may bring to the project contacts, traits, etc. that are either useful or detrimental. If the cohort is repeatedly deemed unacceptable whenever this individual is part of the cohort, then the computer logic will "learn" not to include that individual in future cohorts (block **420**). Similarly, if all or most cohorts that include a certain individual (e.g., a well connected and/or particularly well-respected individual) are deemed acceptable by a project manager, then computer logic will try to include that individual in future cohorts. The process ends at terminator block **422**.

Note that in one embodiment of the present disclosure a cohort is dynamic. That is, members can come into and leave a cohort before and/or during the project, even though the requirements of the project may remain fixed. In this embodiment, newly arriving members of the cohort go through the same analysis described above, such that existing members of a cohort may need to be removed if an optimal combination of members (i.e., members having the needed attributes) is obtained by evicting existing members from the cohort.

Note further that, in one embodiment of the present disclosure, cohort population includes predictions of needs of future cohorts. For example, assume that a computer logic "knows" that additional cohorts will be needed for near or distant future projects. Thus, an "optimal" or "dream team" current cohort may need to be broken up for a present project, in order to keep some of the members of the current cohort available to work on future projects.

The flowchart and block diagrams in the figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present disclosure. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed. The description of various embodiments of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the invention. The embodiment was chosen and described in order to best explain the principles of the invention and the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.

Note further that any methods described in the present disclosure may be implemented through the use of a VHDL (VHSIC Hardware Description Language) program and a VHDL chip. VHDL is an exemplary design-entry language for Field Programmable Gate Arrays (FPGAs), Application Specific Integrated Circuits (ASICs), and other similar electronic devices. Thus, any software-implemented method described herein may be emulated by a hardware-based VHDL program, which is then applied to a VHDL chip, such as a FPGA.

Having thus described embodiments of the invention of the present application in detail and by reference to illustrative embodiments thereof, it will be apparent that modifications and variations are possible without departing from the scope of the invention defined in the appended claims.

What is claimed is:

1. A computer implemented method of allocating human resources to a cohort, the computer implemented method comprising:

a processor identifying at least one attribute held by each member of a group of human resources;

the processor receiving, from a planned cohort, a request for multiple human resources that collectively possess a set of predefined attributes, wherein no single human resource possesses all of the predefined attributes;

the processor assigning multiple cohorts to a workgroup, wherein each of the multiple cohorts satisfies at least one unique need of a project to which the workgroup is assigned, wherein the project is in a particular field;

the processor data mining on-line content by using a crawling logic to identify every paper written by a candidate cohort member, wherein the crawling logic identifies said every paper written by the candidate cohort member and available from an on-line database, and wherein the crawling logic blocks an identity of the on-line database from being revealed to non-crawling logic;

the processor determining, based on the data mining, that the candidate cohort member used a term from a specialized lexicon of a particular field in every paper written by the candidate cohort member during a current year in which the data mining occurred;

the processor determining, based on the data mining, that the candidate cohort member never used the term from the specialized lexicon of the particular field in any paper written by the candidate cohort member before the current year in which the data mining occurred;

the processor, in response to the data mining determining that the candidate cohort member used the term from the specialized lexicon of the particular field in every paper written by the candidate cohort member during a current year in which the data mining occurred, and in response to the data mining determining that the candidate cohort member never used the specialized lexicon of the particular field in any paper written by the candidate cohort member before the current year in which the data mining occurred, assigning the candidate cohort member to the planned cohort to create an updated planned cohort;

the processor receiving a request for data that describes the updated planned cohort from a requester; and

the processor, in response to receiving the request for the data that describes the updated planned cohort, transmitting the data that describes the updated planned cohort to the requester.

2. The computer implemented method of claim **1**, further comprising:

the processor predicting a run time for the project, wherein the run time comprises a start date and a completion date for the project;

the processor predicting run time availability of members of the set of human resources;

the processor determining if all members of the set of human resources will be available at run time; and

the processor, in response to determining that all members of the set of human resources will not be available at run time, identifying a new set of human resources in which all members will be available at run time to satisfy the request.

3. The computer implemented method of claim **1**, further comprising:

the processor determining that working on the project would be more professionally beneficial to a first human resource candidate than a second human resource candidate; and

the processor matching the first human resource candidate to the cohort based on said at least one unique need of the project and said determining that working on the project would be more professionally beneficial to the first human resource candidate.

4. The computer implemented method of claim **3**, further comprising:

the processor receiving a user-input that identifies the need of the particular human resource.

5. The computer implemented method of claim **3**, wherein the project is for an enterprise, and wherein the computer implemented method further comprises:

the processor identifying the need of the particular human resource based on an enterprise rule.

6. The computer implemented method of claim **1**, further comprising:

the processor identifying compatibility requirements of members of the planned cohort, wherein at least one of the compatibility requirements is based on two or more members having no ethical conflicts of interest by working together with one another; and

the processor assigning compatible members to the planned cohort.

7. The computer implemented method of claim **6**, wherein the compatibility requirements are further based on complementary attributes of the members of the planned cohort.

8. The computer implemented method of claim **6**, wherein the compatibility requirements are further based on different work calendars of the members of the planned cohort.

9. The computer implemented method of claim **1**, wherein at least one of the predefined attributes is a specific type of license held by a human resource.

10. The computer implemented method of claim **1**, wherein at least one of the predefined attributes is a predefined level of education of a human resource.

11. The computer implemented method of claim **1**, wherein at least one of the predefined attributes is a predefined physical device owned by a human resource.

12. The computer implemented method of claim **1**, wherein at least one of the predefined attributes is a predefined medical condition of a human resource.

13. The computer implemented method of claim **1**, further comprising:

the processor assigning a weight to each prospective member of the group of human resources, wherein the weight describes how valuable each prospective member is to the planned cohort based on the set of predefined attributes; and

the processor assigning members to the planned cohort based on assigned weights.

14. A computer program product for allocating human resources to a cohort, the computer program product comprising a non-transitory computer readable storage medium having program instructions embodied therewith, the program instructions readable and executable by a processor to cause the processor to:

identify at least one attribute held by each member of a group of human resources;

receive, from a planned cohort, a request for multiple human resources that collectively possess a set of predefined attributes, wherein no single human resource possesses all of the predefined attributes;

assign multiple cohorts to a workgroup, wherein each of the multiple cohorts satisfies at least one unique need of a project to which the workgroup is assigned, wherein the project is in a particular field;

data mine on-line content by using a crawling logic to identify every paper written by a candidate cohort member, wherein the crawling logic identifies said every paper written by the candidate cohort member and available from an on-line database, and wherein the crawling logic blocks an identity of the on-line database from being revealed to non-crawling logic;

determine, based on the data mining, that the candidate cohort member used a specialized lexicon of a particular field in every paper written by the candidate cohort member during a current year in which the data mining occurred;

determine, based on the data mining, that the candidate cohort member never used the specialized lexicon of the particular field in any paper written by the candidate cohort member before the current year in which the data mining occurred;

in response to the data mining determining that the candidate cohort member used the term from the specialized lexicon of the particular field in every paper written by the candidate cohort member during a current year in which the data mining occurred, and in response to the data mining determining that the candidate cohort member never used the specialized lexicon of the particular field in any paper written by the candidate cohort member before the current year in which the data mining occurred, assign the candidate cohort member to the planned cohort;

receive a request for data that describes the updated planned cohort from a requester; and

in response to receiving the request for the data that describes the updated planned cohort, transmit the data that describes the updated planned cohort to the requester.

15. The computer program product of claim **14**, wherein the program instructions, when read and executed by the processor, further cause the processor to:

assign multiple cohorts to a workgroup, wherein each of the multiple cohorts satisfies at least one unique need of a project to which the workgroup is assigned.

16. A computer system comprising:

one or more processors;

one or more non-transitory computer readable memories operably coupled to the one or more processors; and

program instructions stored on at least one of the one or more non-transitory computer readable storage mediums for execution by at least one of the one or more processors via at least one of the one or more non-transitory computer readable memories, the program instructions comprising:

program instructions configured to identify at least one attribute held by each member of a group of human resources;

program instructions configured to receive, from a planned cohort, a request for multiple human resources that collectively possess a set of predefined attributes, wherein no single human resource possesses all of the predefined attributes;

program instructions configured to assign multiple cohorts to a workgroup, wherein each of the multiple cohorts satisfies at least one unique need of a project to which the workgroup is assigned, wherein the project is in a particular field;

program instructions configured to data mine on-line content by using a crawling logic to identify every paper written by a candidate cohort member, wherein the crawling logic identifies said every paper written by the candidate cohort member and available from an on-line database, and wherein the crawling logic blocks an identity of the on-line database from being revealed to non-crawling logic;

program instructions configured to determine, based on the data mining, that the candidate cohort member used a specialized lexicon of a particular field in every paper written by the candidate cohort member during a current year in which the data mining occurred;

program instructions configured to determine, based on the data mining, that the candidate cohort member never used the specialized lexicon of the particular field in any paper written by the candidate cohort member before the current year in which the data mining occurred;

program instructions configured to, in response to the data mining determining that the candidate cohort member used the term from the specialized lexicon of the particular field in every paper written by the candidate cohort member during a current year in which the data mining occurred, and in response to the data mining determining that the candidate cohort member never used the specialized lexicon of the particular field in any paper written by the candidate cohort member before the current year in which the data mining occurred, assign the candidate cohort member to the planned cohort;

program instructions configured to receive a request for data that describes the updated planned cohort from a requester; and

program instructions to, in response to receiving the request for the data that describes the updated planned cohort, transmit the data that describes the updated planned cohort to the requester.

17. The computer system of claim **16**, wherein the program instructions further comprise:

program instructions configured to assign multiple cohorts to a workgroup, wherein each of the multiple cohorts satisfies at least one unique need of a project to which the workgroup is assigned.

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